

LETTERS TO THE EDITOR.

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British Association; Section A.

As an old member interested in the welfare of Section A, and appreciative of the useful work it has long done in bringing physicists and mathematicians of various kinds together, I want to suggest that the comparatively recent practice of crowding all its multifarious work on to a few days, and getting through it by sitting in duplicate and by hurry, is unsatisfactory. This suggestion is not intended as a complaint, but as a warning that such a method of dealing with Section A must sooner or later result in its disintegration into two or more sections.

So long as it keeps together—and it is much to be desired that it should keep together, so that workers in different fields may hear something of each other's results—it is necessary that it should take all the time allowed to it, and sit as a rule both on Saturday and on Wednesday. The Saturday meeting is especially important. In the old days the mathematicians frequently had an excellent opportunity on that day, of which they took full advantage. So also the final meeting on Wednesday, for some of the papers on minor experimental points, and for such as had been postponed from other days, has also been often quite interesting.

If Saturday is not utilised, some of the senior members are apt to leave at the week end, and the discussions on future days then lack some of their interest and importance.

The only reason for not meeting on Saturday is on account of excursions. It is to be hoped that excursions will not be allowed to ruin the meeting. Saturday excursions are an innovation: they began as visits to works and the like, in the immediate neighbourhood, on the afternoon; and the full-day excursions were kept for the second Thursday.

An attempt was made to diminish the excursions by abolishing the second Thursday, with the unfortunate result that excursions have now encroached on and consumed the Saturday—which is much worse. There are sections perhaps, such as C, and no doubt others, of which excursions are an important feature; but it is not so with A. Let me urge the officers of that section to return to the older practice, and to aim at taking meteorology on Monday, general physics and astronomy on Thursday and Monday, pure physics on Friday and Tuesday, pure mathematics on Saturday, and an overflow, together with experimental papers, on Wednesday. Then allied sections, such as B and G, can take papers of more interest to physicists on the Monday, as indeed used to be, and perhaps is, their custom; and Section L might perhaps then assist Section A with some of the interesting and important papers on details connected with teaching.

Another minor matter is to express my belief that sectional committee meetings would be more convenient, and likely to be better attended, in the afternoon than in the early morning. But on that there may easily be differences of opinion.

OLIVER LODGE.

Fecundity of the Leopard Moth.

A SPECIMEN of the above (*Zeuzera aesculi*) was sent to me by post in a tin box a few days ago from Felixstowe. The moth was dead when it reached me, but had laid eggs in the box. As there seemed to be such a large number I had the curiosity to have the eggs counted, and it was found that there were 725. It is, of course, impossible to say whether this represents the whole family or whether she may have laid some eggs previous to capture.

The relative fecundity of different species of insects in relation to their life-habits is an interesting subject from the selectionist's point of view. The caterpillar of this moth is a wood borer, and the conditions for favourable nutrition may be difficult to find, so that a high fecundity has been developed in order to meet precarious conditions of survival. Other wood borers seem also to lay large numbers of eggs, but I do not know whether the families have ever been counted. As a contribution to the subject this observation appeared worthy of record.

Nairn, N.B., August 10.

R. MELDOLA.

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THE SECOND INTERNATIONAL CONGRESS
ON SCHOOL HYGIENE.

THE Second International Congress on School Hygiene was opened on August 5, and closed on August 10. The papers were mainly practical. At the first congress (Nuremberg, 1904) there was a distinctly greater proportion of research work; but this was due to the fact that the medical examination of school children had been longer established in Germany, Austria, and other European countries than it has been in England. Such scientific investigation as the present congress has evoked is almost exclusively directed towards justifying immediate administrative measures, or developing existing organisations. For example, medical inspection has, in England and Scotland, now all but become a widespread reality, and the hygiene of school buildings and school work has rapidly grown into a speciality. We here indicate the main problems raised for discussion.

(1) *Methods of Medical Inspection.*—The desirability of medical inspection has been assumed at every section. The chief concern is to what extent it shall proceed. Dr. Méry (Paris) maintained that the first examination on entry to school should include (a) an anthropometric record of weight, height, chest measure, dynamometric observations; (b) physiological record of the primary educational senses—eye and ear; (c) a medical record of all the organs—throat, lymphatic system, skin, skeleton, lungs, heart, &c. He insisted on the extreme value of minute thoracic measurements, as shown by insurance results. Experiment has shown that spirometry as a test of lung conditions is not practicable with children. The minute measurements required to establish the "thoracic index" can be carried out only by skilled specialists.

The other papers on medical inspection recommend only a medical examination, conducted strictly in relation to the school-work required. Accounts were given of the methods of report and examination employed in Sweden, Breslau, Wiesbaden, Leipzig, Nice, and other places.

Dr. Clement Dukes (Rugby) gave the results of an elaborate physical examination of 1000 boys of ages thirteen to fifteen. The boys were taken as they entered the public school. This paper is of great practical value. It deals with boys whose home-nurture was of the best possible. As tested by Dr. Roberts's standard tables, 522 boys were above the normal height; 113 were average; 365 below normal. In weight, 472 were above normal; 57 average; 471 below normal. In chest measurement, 445 were above normal; 132 average; 423 below. Acquired deformities (such as spinal curvatures, pigeon-breast, bow legs, flat feet) were surprisingly numerous. E.g. there were 529 cases of knock-knee; of lateral curvature of spine, 445; of flat-feet, 329. There were 13 cases of eustachian deafness; 19 of aural deafness. Hypermetropia, 40; myopia, 128; astigmatism (considerable), 27. Heart disease, 10. Albuminuria, 157. This is a startling figure. As to puberty, 317 had attained the state between thirteen and fifteen years; in a few cases, not until fifteen. This research is the most elaborate yet published regarding English public school boys. It has an important bearing on the question of environmental *versus* germinal deterioration.

(2) *Effect of School on Health.*—Dr. Hüttel (Prague) records that the upper classes suffer more in nutrition than the lower from bad teeth. Myopia is admitted to be a result of school work. Girls suffer more than boys from spinal curvature. Nervous diseases, headaches, insomnia, night-terrors, are more frequent in the higher classes.

Tuberculosis.—Dr. Oldwright (Toronto) deals with the schoolroom as a factor in tuberculosis. As to

teachers, he shows that, in the returns of six great cities (Baltimore, District of Columbia, New York, Brooklyn, Philadelphia, Boston), female teachers in schools rank next to highest in order of mortality from consumption, printers and pressmen being highest. This is confirmed by other returns. The ratio of consumption-deaths per 1000 deaths is found uniformly higher among teachers (male and female) than in all other occupations. Chalk dust is suggested as one factor in causing this exceptional incidence.

Dr. Arthur Newsholme (Brighton) states, as the result of a careful examination of 806 children (conducted by Dr. Lecky), and a comparative analysis of other figures from Dundee, Dunfermline, and Edinburgh, that he is inclined "to think that there is not, on the average, more than 1 in 300 children in schools showing revealed or diagnosable pulmonary tuberculosis." But "latent tuberculosis" is considerable. Naegeli "found in autopsies of children aged one to five 17 per cent., and of children aged five to thirteen that 33 per cent. had tuberculous lesions." But the origin of the tuberculous infection is almost certainly domestic, not scholastic; though school conditions and work may, and do, provoke latent tuberculosis into activity.

Measles.—The scientific grounds for school closure in measles epidemics were discussed by Dr. Thomas (London) on the basis of 5512 carefully investigated cases. Measles tends to spread when a class accumulates unprotected numbers to the extent of between 30 and 40 per cent., and when spread has begun it extends until the proportion is reduced to between 15 and 20 per cent. unprotected. School closure to be of any use must occur before the first "crop" falls. This conclusion is confirmed by Dr. Davies (Woolwich).

Diphtheria.—Dr. Niven (Manchester) states, as the result of numerous investigations, that the "year of maximum incidence precedes the years of school life," and that the "great drop at age six" is probably due to widespread establishment of immunity. The sanitary condition of the schools has probably less to do with outbreaks than the absence of playgrounds; but aggregation multiplies the chances of infection. The "slight or latent" cases far outnumber the discoverable cases. But many "latent" cases proceed so slowly that an antitoxin is naturally produced, and immunity thus established. In practice, it is well, as Newsholme suggests, "to exclude diphtheria convalescents from school for six weeks after discharge from school and recovery at home." Diphtheria "contacts" may, though not themselves showing any marked symptom, spread the disease.

(3) **School-work and Healthy-mindedness.**—Prof. James Sully, from the standpoint of general psychology, concludes that current educational ideals over-emphasise Rousseau's half-truth that "education is essentially a process of following nature, of observing, understanding, and safeguarding a natural process of development." Healthy-mindedness means vigorous intellectual faculties strongly predisposed to exercise their proper functions. But many facts show that present-day school-work, by excess of book-learning and neglect of the actualities of life, tends to reduce mental vigour and to predispose the average person to accept opinions without examination or test. But there are signs that the schools are conscious of this. Prof. Sully does not seem to allow sufficiently for the large positive content of the reaction against books. This positive content is more obvious in American methods than here. But all agree with him that education ought to produce a "healthy, vigorous attitude of mind."

(4) **Age for School Attendance.**—The science of the English custom of sending to the day-school infants of three to five was examined by Dr. Newsholme. His main conclusion is against the custom, first, on the practical ground that the danger of fatal infection is vastly increased (though the facts are too few to be conclusive); second, because there is no educational advantage. On the opposite side, it was contended that the school, if properly adapted as a play-place, not a work-place, fulfils the functions of the home by giving scope and atmosphere for infantile play-energies and dispositions, which are the biological prelude to education proper. The problem is of profound importance; for it involves the whole theory of the *crèche*, the kindergarten, and the play-centre. But there is no body of scientific evidence to make even a provisional conclusion possible. It is certain, on the other hand, that many schools as they exist are quite unfit for the work of tending infants of three to five, and there is no general "play-curriculum" adapted to their needs. Biologically, it is a doubtful gain to leave the delicate organism of three absolutely to the chance environment of "home" or street, where an ineradicable bias to evil mental habits may readily be produced. Scientifically, the problem remains for future congresses.

A related topic is the vacation camp or holiday home. Many practical descriptions were given, but no criticised quantities. Captain Polviet (Amsterdam) described in detail the practice of a holiday camp in Holland, and the conditions of healthy freedom combined with sport programmes seemed to be realised. The results to health were undoubtedly.

(5) **Physical Training.**—The tendency of the practical educationist is rather to rest in "systems" of muscular training than to make an effort to discover fundamental principles. Such an effort, however, was made by Dr. Hulbert (London), who showed how intimately the voice is affected by the stiffness or elasticity of the body, and so forms an indicator of physical conditions. Position in voice-using must be good, but absolutely free from rigidity. Control of breathing must be acquired by cultivating elasticity of the elastic parts of the chest. Respiration for voice-production should depend on the essential muscles of respiration, not on the external. When the right quality of muscular movement and of muscle is secured by training, good voice naturally results. The ordinary "systems" fail in this, because they rely on coarse muscular movements. For good tone, physical training of the right kind is essential. There are three main factors—position, control of breathing, and the abdominal press.

Dr. Gulick (New York) described the place and limitations of folk-dancing as an agency in physical training. School gymnastics fail to establish habits of exercise, especially in girls. Selected dances can be adapted to the feminine physiological, psychological, social and aesthetic needs. They involve large masses of muscle, and can be carried on two or three times as long as gymnastics without fatigue—a fact of cardinal importance. The instinct feelings are tied up with the neuro-muscular system in a fundamental way, and the dance evokes them in the individual. But dancing fails to correct the faulty postures due to school-desks. It is a useful adjunct to training, but not alone adequate. But the interest excited has led to its securing a high place in the New York elementary and high schools.

(6) **School Work—Duration, Sequence of Lessons, and Seasons.**—Dr. Leo Burgerstein (Vienna) opened a general discussion on this subject, commenting on the practical difficulties of obtaining trustworthy measurements of fatigue. But it is certain that work con-

tinued in a state of fatigue is of no value for obtaining skill. Lessons should never exceed forty-five minutes in high schools, and for pupils under age of puberty. The earlier lessons of the day should last longer than the later. Six-year-old children should not be kept sitting at work for more than half an hour without exercise and rest. For infants and junior pupils, writing should be interrupted every five or ten minutes by change to a comfortable position. Rests should never be used for the purpose of instruction or punishment. Lessons requiring mental effort or memory work should be taken early in the day. Lessons in drawing or needlework should not follow a lesson in bodily exercise. Two lessons requiring mental concentration or near-vision should not follow each other. Season has an effect on quality and quantity of work, school-work being harder in summer.

Prof. Chabot (Lyons) analysed carefully the same problems. In the French elementary school, a lesson does not last more than thirty or forty minutes, but the day's session lasts about an hour and a half, the only rest being change of subject. The official regulations, however, permit a margin of variation, and no lesson must exceed an hour. After discussing fatigue and the details of typical time-tables, Prof. Chabot suggests that from age seven to ten a lesson should run from fifteen to thirty minutes; from age ten to fourteen it should run from thirty to forty-five minutes; after age fourteen, the lessons may last for an hour or an hour and a half. The limit of daily work should be six hours from age seven to twelve; seven hours from age twelve to fifteen; eight hours after fifteen. The rhythm of mental effort—*invention* or *assimilation*, *analysis* or *synthesis*—depends more on the consecutive masters than on the distribution of subjects; but abstract lessons should be followed by concrete lessons and practical exercises. It is preferable to have two or three classes in forenoon and two in afternoon. There is a growing opinion in England that afternoon work is worth little.

(7) *School Suicides*.—Prof. Chlopin (St. Petersburg) gave a paper on suicide and attempted suicide among pupils of Russian middle schools. He had investigated 337 actual and 95 attempted cases. Among school children, the suicide rate is three times higher than among the general population. Shooting, hanging, and poisoning are the leading methods. The chief causes are mental and nervous derangements.

Prof. Eulenberg (Berlin) gave similar facts from Germany (as Prof. Gurlitz has already done in a book recently published in criticism of German school methods). He had traced during the last twelve years 1152 cases of actual suicide among school children. More than 50 per cent. of these were traceable to failure in examinations or overwork at school.

(8) *Economics of Neglected School Children*.—Dr. Cronin (New York) gave an estimate of the waste due to diseases and defects of school children. In 1902 (New York) there were 24,000 exclusions, which, at the known cost of 20 cents a day, represents a loss of 4800 dollars in three months. In a school population of 650,000, 30 per cent. were from one to two years behind their proper class—a loss of about 40 dollars per child, if only one lost year be counted. Thirty per cent. (or 195,000) lose one year in six—a loss of 1,666,666 dollars in each school year. Most of the diseases were preventable, and it is economic waste not to prevent them.

(9) *Anthropometry in School*.—Dr. Shrubsall (London) sketched what the British Association regard as essential in school anthropometry—stature, weight, hair-coloration, iris colours, maximum length and

breadth of head, chest in deep inspiration and expiration, diameters of chest, breadth across shoulders and trochanters, height of head. (The report of the Physical Training Commission [Scotland] contained all these and some other measurements of 1200 school children.) The opinion is general that this work should form a special investigation, and should not be expected of the education authority at the ordinary medical inspection. It certainly takes more time than medical inspection; but the data wanted are of value for anthropology. No results were produced at the congress. Mr. Gray gave details of a uniform scheme of yearly measurements of school children as a basis for estimating deterioration of the race.

Dr. Schuyten (Antwerp) presented a summary of ten years of research in the paedagogical laboratories of Antwerp. It is difficult to overestimate the value of those researches. The chief general conclusions are, (1) that the child, on entering the ordinary school, undergoes physical and mental depression; (2) that growth in muscular power is not regular during the school year, there being a distinct depression in March; (3) that, as tested by the dynamometer, muscular power varies with the season; (4) that voluntary attention decreases from January to July, and increases from October to December; (5) that fatigue increases during the school year from one end to the other without perceptible recovery of energy due to holidays; (6) that the validity of æsthesiometric methods of determining fatigue is now demonstrated (a view contested by Dr. Altschul, of Prague, who criticises Prof. Griesbach's results, and maintains that his own are conclusive against Griesbach's method). The methods used by Dr. Schuyten are ingenious. For instance, in drawings of a "little man" on a uniform-sized white surface by children of different ages, it was found that there is a regular increase in the length and breadth of the figure from $3\frac{1}{2}$ to 6 years of age. At age six, on entrance to school, there is roughly a 40 per cent. reduction in the dimensions, which again increase with age. Schmidt Monnard noted actual slackening in the child's own development at this age.

It is important to have some confirmation of Prof. Griesbach's method of testing fatigue by the æsthesiometer. It has been subjected to much criticism; but its simplicity and ease of application are strong inducements to further definitive experiment. It is undoubtedly the simplest method yet suggested for school children, and research will probably centre round it for some time to come.

(10) *Relations of Medicine and Paedagogy*.—Prof. Griesbach (Muelhausen), who first suggested an international congress on school hygiene, and, as president, carried through the Nuremberg congress with untiring energy, wound up the London congress with an evening lecture on the "Relations between Medicine and Paedagogy." He gave a really encyclopædic view of the whole vast subject, and his printed lecture will remain one of the most important documents of the movement. In a series of elaborate tables he outlined the whole educational curriculum of elementary and higher schools in Germany, giving body to his comments by large masses of analysed observations and records. His table on the relations between circumference of head and mental capacity is a striking record of observations made by himself. The numbers examined were not stated, but they were large enough to justify averages. When the full lecture is published, this table will deserve careful criticism. It sustains the view that, on the average, the larger head goes with the greater mental capacity. The lecture was, in every respect, a worthy close to a great congress.